IN THE CLAIMS

This listing of the claim will replace all prior versions and listings of claim in the present application.

Listing of Claims

Claims 1-3 (canceled).

4. (currently amended)~~The disk controller according to claim 1~~ A disk controller for use in a network environment composed of one or more host computers and one or more disk controllers, each of said disk controllers controlling storage media according to an instruction from the host computers, each of said disk controllers comprising:

a plurality of controllers each having at least one port for controlling a bus protocol between the host computers and a storage system including said disk controllers; and

a cache mechanism for temporarily storing data from the host computers,

wherein said at least one port executes a request from the host computers and in a time sharing manner, transfers data to be stored on the storage media to other disk controllers, and

wherein, when said disk controller has ~~the~~a plurality of ~~independent~~ ports and all of the ports are being used for online processing, said disk controller selects a port with a light online processing load from the plurality of ports in response to a backup instruction from the host and executes backup processing via the port.

5. (currently amended)A disk controller for use in a network environment composed of one or more host computers and one or more disk controllers, each of said disk controllers controlling storage media according to an instruction from the host computers, each of said disk controllers comprising:

a plurality of controllers each having at least one port for controlling a bus protocol between the host computers and storage system including said disk controllers; and

a cache mechanism for temporarily storing data from the host computers,

wherein said at least one port executes a request from the host computers and, transfers data to be stored on the storage media to other disk controllers in a time sharing manner ~~The disk controller according to claim 1~~, and

wherein, when said disk controller has the plurality of controllers each having ~~one port or the~~ a plurality of ports, the disk controller selects a port with a light online processing load from the plurality of ports ~~of the plurality of controllers~~ in response to a backup instruction from the host computer and executes backup processing via the selected port.

6. (original) The disk controller with the plurality of ports according to claim 4, wherein said disk controller selects ~~the~~a port with a light online processing load from ~~the~~a plurality of ports in response to ~~the~~a backup instruction from the host computers and executes ~~the~~ backup processing via the selected port and, at the same time, dynamically checks a load of the selected port to switch from the selected port to another lightly-loaded port even during the backup processing.

7. (original) The disk controller according to claim 6, wherein ~~the~~ port switching for the backup processing is done between ~~the~~ a plurality of ports across the disk controllers.

Claims 8 and 9 (canceled).

10. (currently amended)A disk controller for use in a network environment composed of one or more host computers and one or more disk controllers, each of said disk controllers controlling storage media according to an instruction from the host computers, each of said disk controllers comprising:

a plurality of controllers each having at least one port for controlling a bus protocol between the host computers and a storage system including said disk controllers; and

a cache mechanism for temporarily storing data from the host comptuers,

wherein said at least one port executes a request from the host computers and, at the same time, transfers data to be stored on the storage media to other disk controllers in a time sharing manner.~~The disk controller according to claim 1~~,

wherein, when ~~said disk controller has the plurality of controllers and~~ a controller with a port via which backup processing is being executed fails, the controller is switched to another controller without host computer intervention and ~~the~~ backup processing is continued via a port of the new controller.

Claims 11-18 (canceled).

19. (currently amended)A storage system for data backup comprising:

a plurality of disk devices storing data from a host;

a disk controller connecting to said host and said plurality of disk devices for transferring said data between said host and said plurality of disk devices,

wherein said disk controller includes a plurality of port controllers each of which connects to a host and other storage systems,

wherein said port controller includes a processor which transfers said data in said plurality of disk devices to said other storage systems and transfers said data between said host and said plurality of disk devices; and

~~Storage system according to claim 18 further comprising~~a disk array controller,

wherein said disk array controller ~~comprising~~ comprises:

a memory ~~stored~~ which stores ~~a~~ performance information of said plurality of port controllers, and

a processor which selects ~~selecting~~ one of said plurality of port controllers to execute data backup according to said performance information.

20. (currently amended)~~Storage~~ A storage system according to claim 19,

wherein said processor ~~ins aid~~in said disk array controller stores process type information into said memory, and makes each port controller execute based on said process type information.

21. (currently amended)~~Storage~~ A storage system according to claim 20, wherein said process type information is at least one of online process only, backup process only ~~or~~and online and backup processes.

22. (currently amended)~~Storage~~ A storage system according to claim 19, said disk controller further ~~comprising,~~comprises:

a plurality of storage controllers having said disk array controller and a plurality of port controllers, and wherein said disk array and port controllers are connected to each other.

23. (currently amended)~~Storage~~ A storage system according to claim 22, wherein said processor of said disk array controller in said storage ~~controller~~ refers to said performance information stored in said memory ~~of said storage controller~~ and ~~said~~ performance information stored in ~~said~~a memory of ~~other storage~~another disk array controller, and ~~select~~ selects at least one of said port controllers to execute based on said performance information.

24. (currently amended)~~Storage~~ A storage system according to claim 23, said disk ~~storage~~ controller further ~~comprising~~comprises:

an error controller to detect an error in said ~~storage~~ disk controller,

wherein said error controller connects to said disk array controller and another error controller in another ~~storage~~ disk controller, and sends ~~said~~an error received from said another error controller to said disk array controller, and]

wherein said disk array controller makes said port ~~processor~~ controller continue executing a backup task in response to an error from said error ~~storage~~ controller.

25. (currently amended)~~Storage~~ A storage system according to claim 22, wherein said processor ~~ins aid~~in said disk array controller refers to said performance information in said ~~storage~~ disk controller and ~~said~~ performance information in other ~~storage~~ disk controllers and makes a ~~said~~ port ~~processor~~ controller to continue executing a backup task in said other ~~storage~~ disk controller.

26. (currently amended)~~Storage~~ A storage system according to claim 22, wherein said processor in said disk array controller makes said port controllers continue executing ~~said~~ a backup task simultaneously.

27. (currently amended)~~Storage~~ A storage system according to claim 22, said disk controller further comprising~~,~~:

an interface apparatus having an user interface to indicate a backup task.

28. (currently amended)~~Storage~~ A storage system according to claim 27, wherein said interface apparatus sets ~~said~~ process type information to each said port controller.

29. (currently amended)~~Storage~~ A storage system according to claim 27, wherein said port controller connects to said host computers and said other storage systems via a fibre channel network.

30. (new) A storage system comprising:

a plurality of controllers,

wherein each controller comprises:

a port connected to one or more host computers via a network for receiving ~~a~~ first data transferred from said host ~~computer~~computers,

a port controller connected to said port for controlling said port,

a cache memory connected to said port controller for storing data temporarily,

a disk device group, connected to said plurality of controllers, for storing said first data from said host computers, said disk device group including a plurality of disk devices, and

wherein said port controller receives said first data from said host ~~computer~~ computers via said port, sends second data via said port to an external storage system connected to said port via said network, and executes receiving said first data and sending said second data in a time-sharing manner.

31. (new) A storage system according to claim 30, wherein said controller executes backup processing and online processing via said port.

32. (new) A storage system according to claim 30, wherein said disk device group comprises:

a plurality of logical volumes.

33. (new) A storage system according to claim 32, wherein data is duplexed in said disk device group on two different logical volumes while carrying out backup processing.

34. (new) A storage system according to claim 30, wherein if a backup request is sent from a host computer, said controller executes backup processing to said external storage system and duplexing data stored in said disk device group on two different logical volumes for backup processing in a time-sharing manner.

35. (new) A storage system according to claims 34, wherein said duplexing processing and said backup processing are executed in such a way that said duplexing processing and said backup processing are executed in a time-sharing manner or only duplexing processing is executed and said backup processing is executed at some other time.

36. (new) A storage system according to claim 34, wherein a user may specify a time at which said duplexing processing and said backup processing are executed.

37. (new) A storage system according to claim 34, wherein said backup processing executed during said online processing is scheduled in such a way that performance of said online processing is not degraded.

38. (new) A storage system according to claims 37, wherein a user may specify a performance balance between said online processing and said backup processing by scheduling.

39. (new) A storage system according to claim 30, wherein said controller comprises:

a disk array controller connected to said port controller and said disk device group,

wherein said port controller executes backup processing.

40. (new) A storage system according to claim 39, wherein said disk array controller comprises:

a memory for storing a performance of said port controller; and

a processor which includes said port controller for executing said backup processing according to performance information stored in said memory.

41. (new) A storage system according to claim 40, wherein said processor stores process type information in said memory, and said port controller executes processing based on said process type information.

42. (new) A storage system according to clam 41, wherein said process type information is one of online process only, backup process only, and online and backup processes.

43. (new) A storage system according to claim 30, wherein said controllers are connected to each other.

44. (new) A storage system according to claim 43, wherein each controller includes:

an error controller to detect an error which occurred in said controller,

wherein said error controller connects to said disk array controller and another error controller in another controller, and sends an error received from said another error controller in said another controller to said disk array controller, and

wherein said disk array controller makes said port controller continue executing a backup task in said another controller.

45. (new) A storage system according to claim 39, wherein said controllers are connected to each other, and

wherein said processor refers to performance information stored in said memory disposed in said controller and performance information in other controllers stored in said memory disposed in said other controller, and makes said port controller continue executing a backup task in said other controllers.

46. (new) A storage system according to claim 30, wherein said controller includes an interface apparatus comprising an user interface to instruct that said port executes one of backup processing only, online processing only and both online processing and backup processing.

47. (new) A storage system according to claim 30, wherein said network is a fibre channel network.

48. (new) A disk controller comprising:

a plurality of controllers;

wherein each controller comprises:

a port connected to one or more host computers via a network for receiving first data transferred from said host computer;

a port controller connected to said port for controlling said port,

a cache memory connected to said port controller for storing said first data transferred from said host computer temporarily,

wherein said controller receives said first data from a host computer via said port, sends record data via said port to a external storage system connected to said

port via said network, executes receiving said first data and sending said second data in a time-sharing manner.

49. (new) A disk controller according to claim 48, wherein said plurality of controllers stores said first data in a disk device group connected to said plurality of controllers comprising a plurality of disk devices.

50. (new) A storage system according to claim 48, wherein said controller executes backup processing and online processing via said port.

51. (new) A storage system according to claim 49, wherein said disk device group comprises:

a plurality of logical volumes.

52. (new) A storage system according to claim 51, wherein data is duplexed in said disk device group on two different logical volumes while carrying out backup processing.

53. (new) A storage system according to claim 49, wherein if a backup request is sent from a host computer, said controller executes backup processing to said external storage system and duplexing data stored in said disk device group on two different logical volumes for backup processing in a time-sharing manner.

54. (new) A storage system according to claims 53, wherein said duplexing processing and said backup processing are executed in such a way that said duplexing processing and said backup processing are executed in a time-sharing manner or only duplexing processing is executed and said backup processing is executed at some other time.

55. (new) A storage system according to claim 53, wherein a user may specify a time at which said duplexing processing and said backup processing are executed.

56. (new) A storage system according to claim 53, wherein said backup processing executed during said online processing is scheduled in such a way that performance of said online processing is not degraded.

57. (new) A storage system according to claims 56, wherein a user may specify a performance balance between said online processing and said backup processing by scheduling.

58. (new) A storage system according to claim 49, wherein said controller comprises:

a disk array controller connected to said port controller and said disk device group,

wherein said port controller executes backup processing.

59. (new) A storage system according to claim 58, wherein said disk array controller comprises:

a memory for storing a performance of said port controller; and

a processor which includes said port controller for executing said backup processing according to performance information stored in said memory.

60. (new) A storage system according to claim 59, wherein said processor stores process type information in said memory, and said port controller execute processing based on said process type information.

61. (new) A storage system according to clam 60, wherein said process type information is one of online process only, backup process only, and online and backup processes.

62. (new) A storage system according to claim 48, wherein said controllers are connected to each other.

63. (new) A storage system according to claim 62, wherein each controller includes:

an error controller to detect an error which occurred in said controller,

wherein said error controller connects to said disk array controller and another error controller in another controller, and sends an error received from said another error controller in said another controller to said disk array controller, and

wherein said disk array controller makes said port controller continue executing a backup task in said another controller.

64. (new) A storage system according to claim 58, wherein said controllers are connected to each other, and

wherein said processor refers to performance information stored in said memory disposed in said controller and performance information in other controllers stored in said memory disposed in said other controller, and makes said port controller continue executing a backup task in said other controllers.

65. (new) A storage system according to claim 48, wherein said controller includes an interface apparatus comprising an user interface to instruct that said port executes one of backup processing only, online processing only and both online processing and backup processing.

66. (new) A storage system according to claim 48, wherein said network is a fibre channel network.

67. (new) A disk controller according to claim 4, wherein said bus protocol is the fibre channel protocol.

68. (new) A disk controller according to claim 5, wherein said bus protocol is the fibre channel protocol.

69. (new) A disk controller according to claim 10, wherein said bus protocol is the fibre channel protocol.

70. (new) A disk controller according to claim 10, said controller comprising:

an error controller connected to other controllers, for detecting in said controller,

wherein, when said error controller detects errors in said controller, said error controller notifies said other controllers of said detected error.